



Technical Data Sheet	Grade	Code (SEL)	Cold work tool steel
	1.2767 ESR	45NiCrMo16	

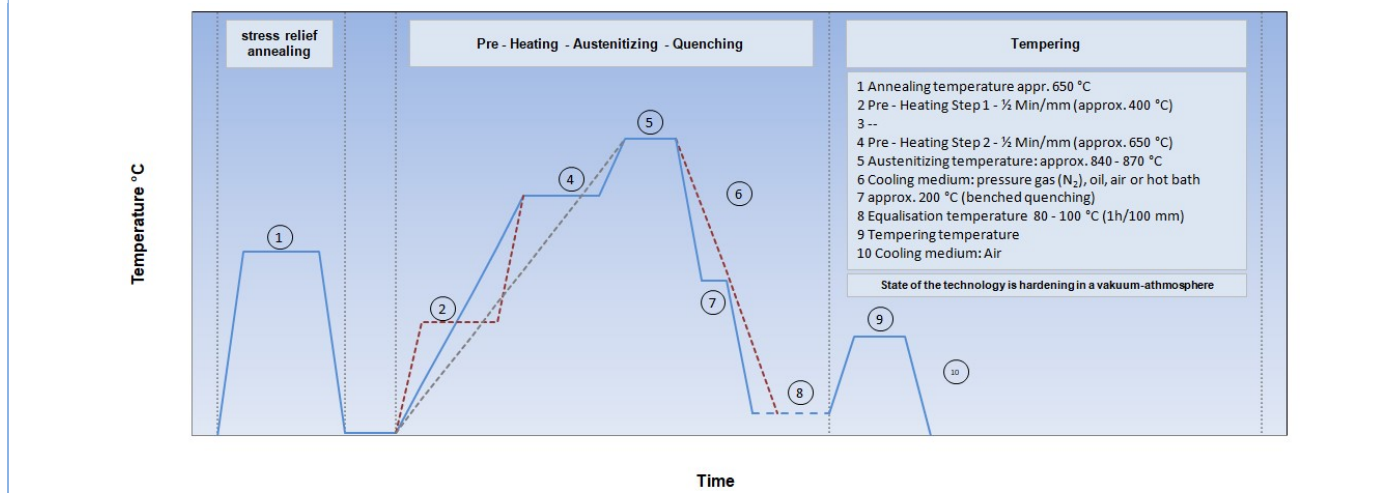
Standards	Steel properties
EN ISO 4957 45NiCrMo16	Ni-alloyed tool steel with highest toughness, excellent polishability, excellent capability for texturing operations and erodible.
AFNOR 45NCD16	
BS -	
UNE -	
UNI 40NiCoMoV16KU	
AISI -	
GOST 40X2H2MA	
Suitable for:	
Plastic moulds, highly stressed coining tools with maximum toughness, tools for heavy cold-forming, highly stressed-blanking dies, dies for jewellery, hobbing tools, cutting-, blanking- and punching tools, shear blades for the thickest cutting material, hobbing tools.	

C	Si	Mn	Cr	Mo	Ni	V	W	Co	Sonst.
0,45	0,25	0,40	1,40	0,25	4,00	-	-	-	-

Melting	ESR	Remarks Enhanced cleanness and homogeneity in comparison to conventional melted 1.2767.
Density (g/cm³)	7,85	
Supply condition	soft annealed	
Hardness (HB)	max. 260	
Tensile strength (N/mm²)	-	
Work hardness (HRC)	-	
Structure	-	
Cleanness (DIN 50602)	K1 < 15	

Physical properties		20 °C	100 °C	200 °C	300 °C	350 °C	400 °C	500 °C	600 °C	700 °C
Thermal expansion coefficient	10 ⁻⁶ * K (20 °C bis ...)	-	11,7	12,6	13,1	-	13,5	14,0	-	-
Thermal conductivity (W / m * K)	annealed	38,2	-	-	-	-	-	-	-	-
	quenched + tempered	-	-	-	-	-	-	-	-	-

Thermal Cycle Diagram (Heat treatment)

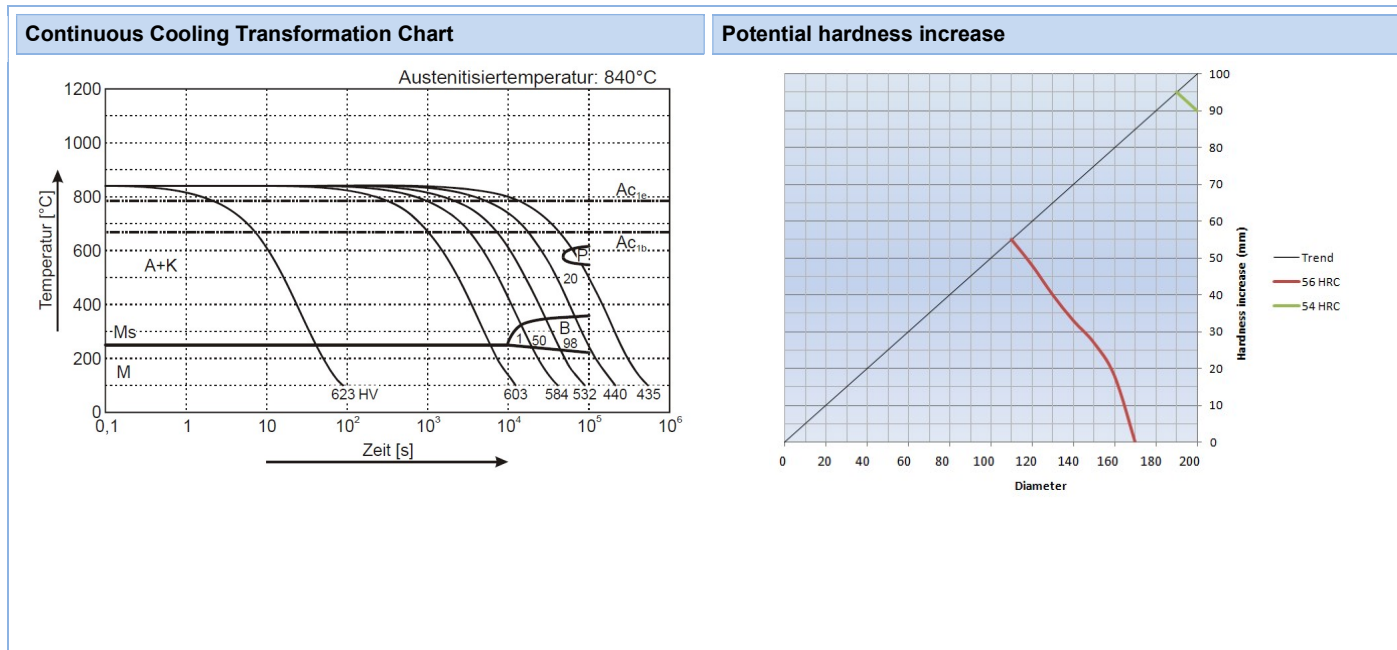


Hinweis: Die in diesem Datenblatt enthaltenen Angaben dienen der Beschreibung, eine Haftung ist ausgeschlossen.



Heat treatment	Temperature (°C)	Cooling	Remarks heat treatment
Soft annealing	610 - 650	Furnace	Controlled slow cooling in furnace
Stress-relief annealing	ca. 650	Furnace	Slow cooling in furnace. After extensive machining process or complex shapes
Hardening	840 - 870		After through-heating hold for 15-30 minutes
Pre – heating Step 1	appr. 400		
Pre – heating Step 2	appr. 650		
Pre – heating Step 3	-		
Quenching	appr. 200	hot bath	To reduce as possible thermal stress, size alteration and distorsion it is recommended to use the softest quenching medium.
	appr. 80	Oil	
	appr. 80	Air	Oftentimes a hot bath hardening with the advantage of less thermal stress. To avoid stress corrosion cracks the steel has to be carried out immediately after hardening and when the steel is at appr. 80 °C.
	appr. 80	pressure gas	Cooling down to RT has to be disabled. In case of oil hardening interrupt at appr. 150 °C.

Tempering Chart		Tempering – Hardness after tempering									
	Temperature °C	100	200	300	400	500	550	600	650	700	
	HRC	56	54	50	46	42	-	38	-	-	
Remarks for tempering Slow heating to tempering temperature immediately after hardening. Time in furnace 1 hour for each 20 mm of workpiece thickness but at least 2 hours.											



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